VASCULAR AND ENDOVASCULAR SURGICAL TECHNIQUES

An Atlas

Third Edition

Edited by

ROGER M. GREENHALGH MA, MD, MChir, FRCS

Professor of Surgery, Charing Cross and Westminster Medical School, London, UK

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Endoluminal stented graft aorto-bifemoral reconstruction

MICHAEL L. MARIN MD, *Assistant Professor of Surgery*
FRANK J. VEITH MD, *Professor of Surgery*
Division of Vascular Surgery, Montefiore Medical Center–Albert Einstein College of Medicine, New York, New York, USA

Introduction

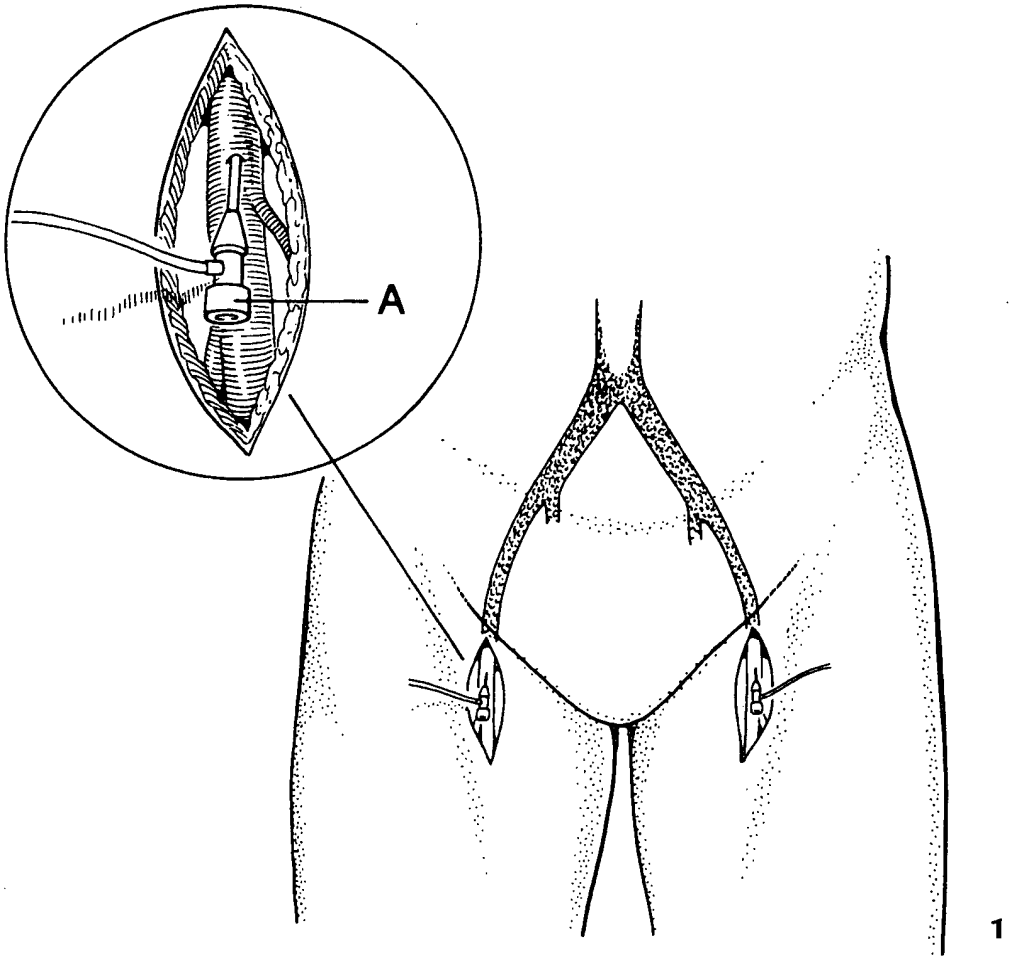
Aorto-bifemoral bypass has been the operation of choice for extensive aorto-iliac occlusive disease (Brewster and Darling, 1978). In some instances, local stenotic or occlusive lesions of the iliac arteries can be managed by percutaneous techniques including balloon angioplasty (PTA) and intravascular stenting (Palmaz *et al.*, 1992). In appropriately selected patients, both of these therapies have achieved excellent long-term results for the treatment of clinically significant iliac disease. Despite good results with these techniques in selected patients, there are recognized complications and limitations to both approaches. Aorto-iliac surgical reconstruction may be associated with perioperative complications including, bleeding, infection, impotence and cardiac ischaemia. Similarly, results of catheter based techniques such as PTA and stenting may be compromised by early and late failures, bleeding at the site of percutaneous entry, and in some instances, distal embolization.

Another technique which blends surgical- and catheter-based technologies for treating aorto-iliac occlusive disease is a stented graft endoluminal reconstruction (Parodi, Palmaz and Barone, 1991; Marin *et al.*, 1993; Cragg and Drake, 1993). While this technique is currently novel, it shows promise for minimally invasive management of long segment aorto-iliac and femoral artery occlusive disease. It is a procedure that is feasible to perform under general, regional or local anaesthesia and it can be performed safely in patients who have serious co-morbid medical illnesses.

Procedure

1

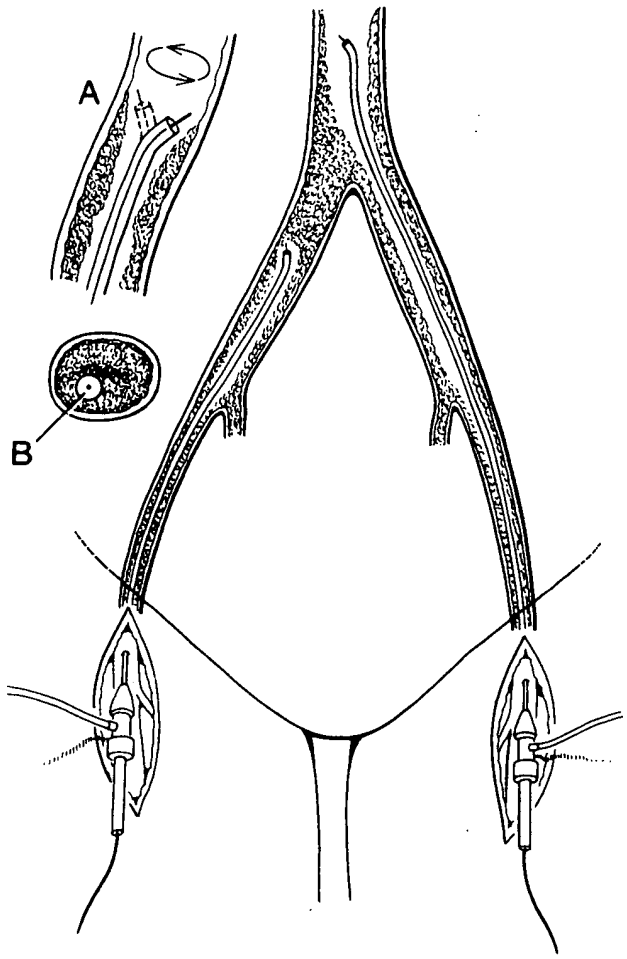
Suitable diagnostic arteriography must be performed before the initiation of a stented graft aorto-iliac reconstruction. When total aortic occlusions are encountered, this study can be effectively performed through a translumbar aortic or brachial artery puncture. Visualization must include the proximal and distal abdominal aorta, as well as all the outflow vessels into both lower extremities. When a total aortic occlusion is present below the renal arteries, it may be necessary to perform an aortic arch contrast injection to provide visualization, via collateral vessels, of the femoral and popliteal arteries. Once diagnostic arteriography has been completed, a determination can be made of the best site for access into the vascular system. A transvascular endoluminal graft can be inserted through a stenotic or totally occluded vessel. A total occlusion is approached via an open arteriotomy in the reconstituted femoral artery just distal to the external iliac occlusion. A 7 French introducer catheter is inserted into the lumen of the reconstituted artery distal to the occlusion. Through this introducer catheter, controlled arterial recanalization can be performed.



1

2

Through the introducer catheters, a recanalization wire and a directional catheter are inserted. We use 105° curved tip Berenstein catheter (CR BARD, Inc., Billerica, Massachusetts) for this function. An effort is made to direct the recanalzation wire and catheter totally within the intraintimal layer of the occluded artery. A variety of recanalization wires are used depending on the anatomic situation and composition of the occlusion. The most commonly employed recanalization wire is a hydrophilic 0.035 inch stiff glide wire (Meditech, Corporation, Watertown, Massachusetts). Once the recanalization wire and catheter have been successfully directed through the occluded segment into the lumen of the proximal patent vessels the same procedure is repeated on the contralateral side. Satisfactory proximal intraluminal position is confirmed fluoroscopically by injection of dye through the catheter.



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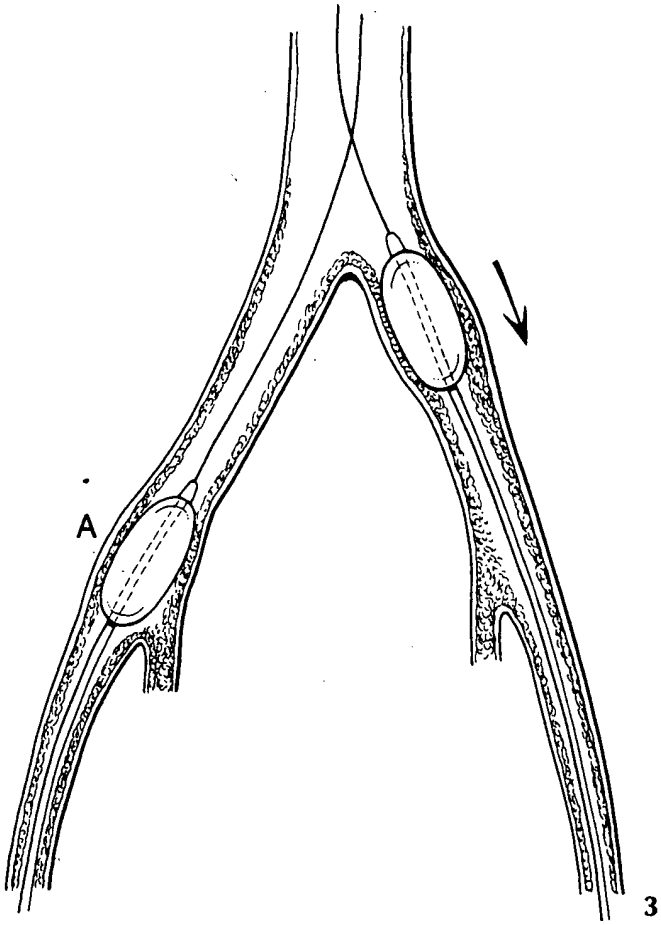


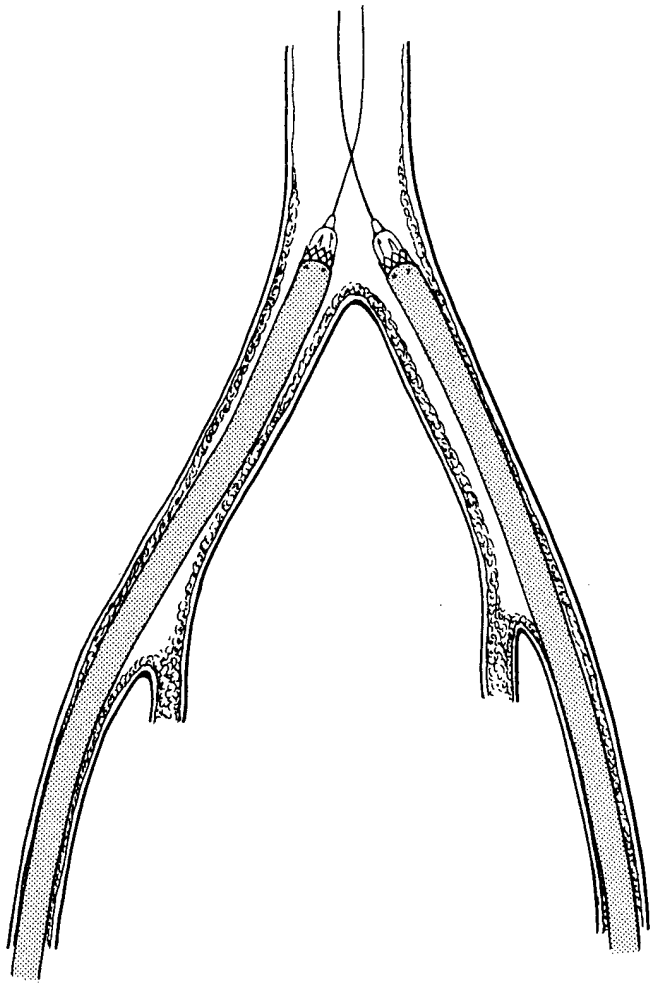
3

3

Using the Seldinger Technique, the directional catheter is removed leaving the wire in place, and a balloon angioplasty catheter is inserted over the wire through the introducer catheters into both iliac arteries. We use 8 mm balloon dilatation catheters for the majority of iliac artery dilatations in preparation for placement of stented grafts. The iliac artery is dilated over its entire length down to the level of the arterial entrance site of the introducer catheter.

4

Recanalization wires in both iliac arteries are held in a stable position, and the introducer catheters are removed bilaterally. A new (14 French) introducer catheter preloaded with a folded 6 mm polytetrafluoroethylene (PTFE) graft and Palmaz stent is inserted. The Palmaz stent is sutured to the proximal end of the PTFE graft using four PTFE stabilizing sutures (Goretex, Flagstaff, AZ). Using fluoroscopic control, the two stent-graft devices and their radiopaque Palmaz stents are positioned at a preselected site in each iliac artery creating an aortic bifurcation. The balloons underlying the two Palmaz stents in each common iliac artery are simultaneously inflated to synchronously deploy both stents. Two dilatations are performed of each stent to ensure firm fixation of the stent to the arterial wall. The balloon catheters are then used to gently dilate the PTFE grafts in a serial descending segmental fashion as each balloon is withdrawn. The introducer catheters and balloons are then removed. At the completion of this step, free ends of both PTFE grafts are visible within the vessel arteriotomy site. Completion arteriograms are performed by retrograde injection to inspect for technical problems or possible arterial recoil. If extrinsic compression is noted, balloon dilatation is carried out through the PTFE graft.



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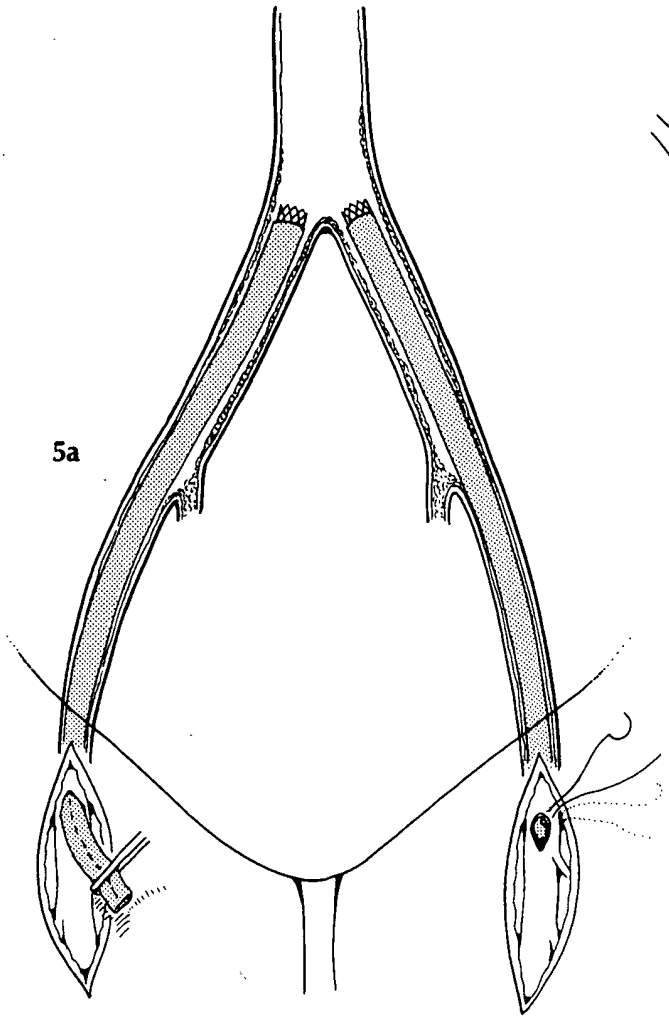

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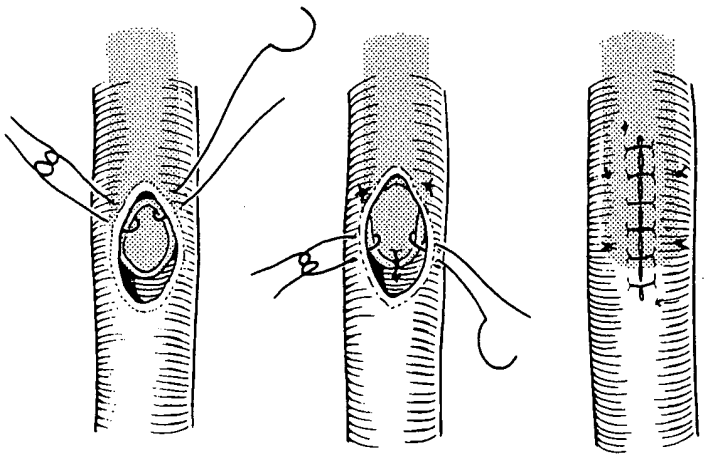

5b

5a & b

The distal free end of the PTFE graft is then sutured to the inside of the patent segment of the common femoral artery in an endoluminal fashion with a series of interrupted polypropylene sutures placed from within. This technique is similar to that used for tacking a distal intimal flap at the time of an endarterectomy. After careful inspection of the entire completed anastomosis, each graft is carefully flushed of possible thrombotic material prior to the placement of a running suture closure of the arteriotomy. After careful inspection for adequate haemostasis, each groin wound site is closed in layers using an absorbable suture. Postoperative care and assessment of an endoluminal graft is identical to that for a standard arterial reconstruction. Physical examination and non-invasive laboratory testing including duplex ultrasonography are useful techniques for detecting technical defects and the failing state. If defects or diminished flow are detected, arteriography and appropriate correction should be performed using catheter-guidewire (balloon/stent) or surgical techniques.

Acknowledgements

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